

REMARKS

This preliminary amendment accompanies a Request for Continued Examination (RCE) and is responsive to the final Office action of March 25, 2009.

Claims 31, 34-49 and 52-62 are pending. Claims 31 and 49 have been amended to clarify the claimed subject matter. New claims 61 and 62 have been added and find support throughout the specification. No new matter has been added.

Applicant asks that all claims be examined in view of the amendment to the claims.

Claims 31, 34, 37-41, 44-47, 49, 52-55 and 58-60 were rejected under 35 U.S.C. §103(a) as obvious over Fuerschbach et al. (US 4,815,534) in view of Usui (US 4,223,826) and Mizuhara (US 4,497,772).

Claim 31, as clarified, recites a heat exchanger with plates substantially manufactured in stainless steel containing chromium. The plates have connection surfaces surrounding one or more port channels. The connection surfaces are formed by a nickel-based material that permits brazing more easily than stainless steel and that is more susceptible to reduction than chromium dioxide. The foregoing claim features can be appreciated by referring to the exemplary heat exchanger in FIGS. 1 and 2, which includes plates 1 substantially manufactured in stainless steel containing chromium. The plates 1 have connection surfaces 5 surrounding one or more port channels 4

As discussed generally on page 2, lines 6-21 of the present application, brazing a pipe member to a stainless steel surface that includes chromium is difficult. If the stainless steel includes a significant amount of chromium, it is difficult to achieve a secure connection. If, on the other hand, the stainless steel has a lower amount of chromium, it becomes necessary to use more aggressive and toxic fluxing agents, which raises the likelihood of creating environmental or health-related issues. In some implementations, the claimed subject matter addresses these difficulties by providing a connection surface that is more susceptible to reduction than chromium dioxide and that makes it easier to achieve a secure connection.

As discussed below, the Fuerschbach, Usui and Mizuhara patents, alone or in any reasonable combination do not disclose or render obvious the claimed subject matter.

The Fuerschbach patent discloses a plate heat exchanger in which stainless steel plates are brazed together in a stacked assembly. *See Abstract and col. 6, lines 16-20.* The heat exchanger includes openings (e.g., 40, 40a, 41 and 41a) that extend through some of the plates. Braze alloy sheets 22 are positioned between some of the plates. *See FIG. 2.* Threaded fittings IO, OC, IH and OH are positioned above a top one of the plates. The assembly is placed in an oven or brazing environment to heat the assembly until the braze alloy sheets become sufficiently molten as to effect a connection of the components as a unitary structure. *See col. 6, lines 59-64.*

The Fuerschbach patent does not disclose: (1) plates substantially manufactured in stainless steel and containing chromium, (2) with a connection surface formed by a nickel-based material that is easier to braze to than to stainless steel or (3) where the nickel-based material is more reduction susceptible than chromium dioxide, as recited in claim 31. The Office action essentially concedes these points.<sup>1</sup>

Nor does the Usui patent, alone or in any reasonable combination with the Fuerschbach patent, disclose or render obvious the foregoing claim features.

The Usui patent relates generally to a method of brazing stainless steel with stainless steel or stainless steel with another metal. Col. 1, lines 6-7. The method includes providing the stainless steel with copper plating before brazing and then brazing the plated stainless steel using a copper base-tin alloy brazing material. *See col. 2, lines 30-36 and 49-53 and Abstract.*

The Office action alleges that it would have been obvious to manufacture the Fuerschbach plate type heat exchanger using the Usui brazing techniques, because this would have produced a “stronger bond than traditional brazing methods.” This is not correct. Whether or not a person of ordinary skill would have considered that the Usui brazing techniques to have produced a stronger bond than “traditional brazing methods” has no relevance to whether that

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<sup>1</sup> The Office action, at pages 3-4, states, “‘Fuerschbach et al do not explicitly teach the connection surface to include a material to permit brazing of the pipe member to the connection surface in a more easy manner than to stainless steel, the material being more susceptible than chromium dioxide, or for that material to include nickel.’”

person would have considered the Usui brazing techniques to have produced a stronger bond than the interconnection techniques disclosed in the Fuerschbach patent. Indeed, the Fuerschbach patent application was filed a considerable amount of time after the Usui patent even issued. Since a person of ordinary skill would have had no reason to think the brazing techniques in the much earlier Usui patent would have produced a stronger bond than the interconnection techniques in the later-filed Fuerschbach patent, the Office action has failed to present a reason why that person would have made this substitution.

Moreover, as discussed below, even if the suggested combination of the Fuerschbach plate type heat exchanger with the Usui brazing technique had been obvious, there still would have been significant differences between the resulting system and the subject matter of claim 31 and these differences are not disclosed in or obvious in view of the Mizuhara patent.

Applicant submits that if the Fuerschbach plate type heat exchanger had been manufactured using the Usui brazing techniques, as the Office action alleges would have been obvious, the resulting structure still would not include: (1) plates substantially manufactured in stainless steel containing chromium; (2) a connection surface surrounding a ports in the plate of nickel-based material; (3) a connection surface material that is easier to braze to than stainless steel; or (4) a connection surface material that is more reduction susceptible than chromium dioxide, as recited in claim 31.

As discussed below, the Mizuhara patent, alone or in combination with the Fuerschbach or Usui patents, does not disclose or render obvious the features missing from the Fuerschbach/Usui combination.

The Mizuhara patent merely discloses a ductile brazing foil (not a "connection surface") having a composition with a number of elements, including nickel. The brazing foil may be used in brazing various materials (e.g., stainless steel) to aluminum.

The Office action alleges that it would have been obvious to substitute the nickel-containing brazing foil disclosed in the Mizuhara patent in place of the copper base-tin alloy brazing material from the combined Fuerschbach/Usui plate type heat exchanger because "the brazing alloy of Mizuhara is structurally equivalent to that of Usui, and a simple substitution

does not render a structure patentably distinct over an existing structure." Office action, page 4. The Office action also appears to conclude that this allegedly "simple substitution" would have produced the claimed subject matter. Applicant disagrees with both the proffered reason as to why the suggested combination would have been obvious and submits that, even if the proffered reason were valid, the substitution would not have produced the claimed subject matter.

First, a nickel-containing brazing foil (as is disclosed in the Mizuhara patent) is not "structurally equivalent" to a copper base-tin alloy brazing material (as disclosed in the Usui patent). This assertion is self-evident since the Office action provides no evidence that the nickel-containing brazing foil includes copper or tin, as would be found in the copper base-tin alloy. Similarly, the Office action provides no evidence that the copper base tin-alloy includes nickel, as would be found in the nickel-containing brazing foil.

Moreover, whether the Examiner – using impermissible hindsight – considers the substitution of a nickel-containing brazing foil in place of a copper base-tin alloy brazing material to be a "simple substitution" is irrelevant to establishing obviousness. What is relevant to establishing obviousness is whether a person of ordinary skill would have had a reason to make the substitution. In the present application, the Office action fails to identify any such reason.

Finally, even if it had been obvious to modify the Fuerschbach/Usui plate type heat exchanger in view of the Mizuhara patent, the claimed subject matter would not have resulted. This is because nothing in the Mizuhara patent would have led a person of ordinary skill to modify the Fuerschbach/Usui plate type heat exchanger in such a way that the resulting product would include: (1) plates substantially manufactured in stainless steel and containing chromium, (2) with a connection surface formed by a nickel-based material that is easier to braze to than to stainless steel or (3) where the nickel-based material is more reduction susceptible than chromium dioxide, as recited in claim 31.

Claim 31 should be allowable for at least the foregoing reasons.

Claim 49 recites subject matter that is similar to the subject matter of claim 31.

More particularly, claim 49 recites a method for manufacturing a plate heat exchanger including heat exchanger plates that are substantially manufactured in stainless steel containing chromium and have a connection surface surrounding at least one of its port channels. The method includes applying a nickel-based material to forms the connection surface and to permit brazing of a pipe member to the connection surface in a more easy manner than to stainless steel, where the nickel-based material is more reduction susceptible than chromium dioxide.

As discussed above, the Fuerschbach, Usui and Mizuhara patents, alone or in any reasonable combination, do not disclose or render obvious the claimed subject matter.

Claim 49 should be allowable for at least the foregoing reasons.

Claims 34, 37-41, 44-47, 49, 52-55 and 58-60 depend from claim 31 or 49 and should be allowable for at least the same reasons as the claims from which they depend.

Claims 35 and 36 were rejected under 35 U.S.C. §103(a) as obvious over Fuerschbach et al. (US 4,815,534) in view of Usui (US 4,223,826) and Mizuhara (US 4,497,772) and further in view of Wells (US 3,675,311).

Claims 35 and 36 depend from claim 31. As discussed above with reference to claim 31, the Fuerschbach, Usui and Mizuhara patents, alone or in any reasonable combination, do not discloses or renders obvious the claimed subject matter. Nor does the Wells patent, alone or in any reasonable combination with the other references, disclose or render obvious the claimed subject matter.

The Wells patent merely discloses thin-film diffusion brazing of nickel and nickel base alloys. The techniques disclosed include producing a coated material (coated with either titanium or niobium and either silver or gold material) and placing the coated material between adjacent surfaces to be bonded. The pieces are held together at a temperature in excess of 950.degree. C for a time period sufficient to achieve a solid state diffusion of the material into the nickel or nickel base alloy, and diffusion of the nickel or nickel base alloy into the joint area.

The Wells patent does not relate to plate-type heat exchangers with plates that are substantially manufactured in stainless steel and containing chromium, as recited in claim 31. Indeed, the Wells patent does not even mention stainless steel or chromium. Nor does the Wells patent disclose one or more port channels surrounded by connection surfaces that include a nickel-based material that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide, as recited in claim 31. Nor does the Office action make any contrary allegations.

Claims 35 and 36 should be allowable for at least the foregoing reasons.

Claim 56 also was rejected as being obvious over Fuerschbach in view of Usui and further in view of Wells.

Claim 56 depends from claim 49, which recites subject matter similar to the subject matter of claim 31. As discussed above with reference to claim 31, the Fuerschbach, Usui and Mizuhara patents, alone or in any reasonable combination, do not disclose or renders obvious the claimed subject matter. Nor, for the reasons discussed above with reference to claims 35 and 36, does the Wells patent, alone or in any reasonable combination with the other references, disclose or render obvious the claimed subject matter.

Claim 56 should be allowable for at least the foregoing reasons.

Claims 45 and 46 were rejected as being obvious over Fuerschbach in view of Usui and further in view of Mizuhara (US 4,497,772).

Claims 45 and 46 depend from claim 31. As discussed above with reference to claim 31, none of the cited references, alone or in combination, discloses or renders obvious the claimed subject matter.

Claims 45 and 46 should be allowable for at least the foregoing reasons.

Claims 59 and 60 also were rejected as being obvious over Fuerschbach in view of Usui and further in view of Mizuhara.

Claims 59 and 60 depend from claim 49. For reasons similar to those discussed above with reference to the rejections of claims 45 and 46, the cited references do not disclose or render obvious the claimed subject matter.

Claim 57 was rejected as being obvious over Fuerschbach in view of Usui in view of Mizuhara in view of Wells and further in view of an article from Encyclopedia Britannica, which was attached to the Action.

Claim 57 depends from claim 49. As discussed above, neither Fuerschbach, Usui, Mizuhara, Wells, nor any combination thereof, discloses or renders obvious the claimed subject matter. Nor does the article from Encyclopedia Britannica, alone or in combination with the other cited references, disclose or render obvious the claimed subject matter.

The article from Encyclopedia Britannica discloses, in relevant part, that preparation of brazing surfaces by mechanical or chemical polishing is important. The article does not disclose or renders obvious the subject matter that is missing from the other cited references. Nor does the Office action allege otherwise.

Claim 57 should be allowable for at least the foregoing reasons.

Claims 42 and 43 were rejected as being obvious over Fuerschbach in view of Usui and further in view of the article in the Encyclopedia Britannica.

Claims 42 and 43 depend from claim 31. As discussed above, none of the cited references, either alone or in combination, discloses or renders obvious the claimed subject matter.

Claims 42 and 43 should be allowable for at least the foregoing reasons.

Claim 48 was rejected as being obvious over Fuerschbach, in view of Usui and Mizuhara and further in view of Blomgren (US 6,016,865).

Claim 48 depends from claim 31. As discussed above with reference to claim 31, neither Fuerschbach, Usui, nor Mizuhara, alone or in any reasonable combination, discloses or renders

obvious the claimed subject matter. Nor does the Blomgren patent disclose or render obvious the claimed subject matter.

The Blomgren patent discloses a plate type heat exchanger in which a washer 15 is brazed as part of plate heat exchanger assembly. *See* col. 4, lines 4-10. The Blomgren patent, however, does not disclose a plate heat exchanger with plates substantially manufactured in stainless steel and containing chromium, where the heat exchanger has one or more port channels surrounded by connection surfaces that include a material that permits brazing of a pipe member to the connection surface in a more easy manner than to stainless steel and is more reduction susceptible than chromium dioxide and where the material includes nickel. Nor does the Office action allege otherwise.

Claim 48 should be allowable for at least that reason.

New claim 61 recites a method of manufacturing a plate heat exchanger including providing a number of heat exchanger plates having port channels that extend through at least some of the plates. Each plate has one or more connection surfaces that surround each port channel. The method includes applying a material that is based on nickel to one or more of the connection surfaces; and brazing a pipe member to one or more of the connection surfaces, to which the material that is based on nickel has been applied.

Applicant submits that none of the cited references discloses or renders obvious the claimed subject matter.

Claim 61 should be allowable for at least the foregoing reasons.

New claim 62 depends from claim 61 and, therefore, should be allowable for at least the same reasons as claim 61.

### Conclusion

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or

concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Enclosed is a Petition for a One-Month Extension of Time. The petition fee in the amount of \$ 490.00 and the RCE fee in the amount of \$810.00 are being paid concurrently herewith on the Electronic Filing System (EFS) by way of deposit account authorization.

Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: July 28, 2009

  
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